Transformer Explosion Prevention & Fire Extinguishing System

- Tri-Parulex's Patented System
- ERDA Approved (IP55)
- NABL Accredited Lab Approved (X-7584)
Why NIOES (NIFPS)

Transformer is among the most expensive equipment located in power plants and substation etc. They generally contain a large quantity of combustible substance, which can spread fire to nearby installations also and caused a power failure and can lead to economic losses. So special attention should therefore be paid for their protection.

The traditional System like “High Velocity Water Spray System / Co₂ Gas Flooding System” provides external protection of the transformers and they come into operation once the Fire got initiated around the transformer for the reason whatsoever or in case transformer already got exploded. Whereas “Nitrogen Injection Explosion prevention & Fire Protection System” is an internal protection of the transformer as it prevents the Transformer from its explosion which generally occurs due to over heating / overloading / winding Short-circuiting or for any earth fault etc.,

Please note that this system does not protect the transformer from its external Fire, since Nitrogen is injected inside the body of the transformer, Therefore “Nitrogen Injection Explosion prevention System” is not an alternative for HVWS / Co₂ Flooding System but its Installation is recommended in addition to HVWS / Co₂ Flooding System.

Fire Incidents of Transformer

“Tri-Parulex Nitrogen Injection Explosion prevention & Fire Protection System” is more advanced Transformer prevention for oil immersed transformers in compare to water spray (HVWS) System and Co₂ Flooding System.
How Transformer Explodes & Catch Fire

An Arc is generated due to any internal fault in the Transformer and a high energy flows through transformer which lead to decomposition of insulation/oil at high temperature. Top oil surface attains temperature higher than ignition point. Huge thermal energy is generated thereby emitting combustible gases. Pressure built-up resulting in tank rupture normally at top cover. Hot oil when comes in contact with the oxygen catches fire.

Benefits of NIOES

- On activation, the system extinguish the Fire within seconds.
- It prevent the Transformer from explosion.
- Nitrogen Gas is inert and does not react with transformer oil.
- It is completely Non-Toxic & Non-hazardous.
- It provides best cooling effect to the oil inside the Transformer.
- Forms insulating layer of N2 Blanket on top surface of the oil.
- Less Cost of Installation & Maintenance.
- Environment Friendly.
- Best System for the Areas of water Scarcity.

Our System USP

- Auto Dialer Facility - a pre-recorded message will be sent to already registered phone numbers in the system in case of any system activation. (Max 3 numbers)
- A mechanical interlocking has been provided to ensure that nitrogen injection will not take place into the transformer until the oil drain valve is open.
System Installation

Major Components

Control Panel (PLC / SCADA) (Optional)
TCIV
Fire Detector
Control Panel
Fire Extinguishing Cabinet
Principle of Explosion Prevention & Nitrogen Injection in the transformer

If the transformer is not working properly, an enormous amount of flammable gases will be created inside the oil tank. As a result, the gas relay closes and the electric breaker switches off. At this moment, the internal pressure of the tank increases due to the thermal inertia.

Once the pressure exceeds and reach at its setting value of the pressure relief valve (PRV), the oil drain valve opens to draw off oil in order to relieve the pressure inside the tank and prevent any explosion and fire by activation the System. Consequently, Nitrogen Injection system is operated immediately.

Principle of Extinguishing external fire of the transformer (Optional)

In case the transformer is on fire externally also in addition to the internal problem as defined above for the principle of explosion prevention & Nitrogen Injection, the fire detector is activated, the Gas Relay/PRV closes, and the electric breaker switches off. As a result, the system is operated to drain the oil drain valve opens to draw off oil. Then nitrogen gas is continuously injected and the Foam Spray System activate, and in this process the nitrogen gas cools down the transformer internally, whereas the Foam Spray extinguishes fire externally over the transformer.

Working Conditions

- Fire detector, drain valve, fire protection cabinet could be located outdoor. Control Panel should be located indoor. Around the site there should be no violent vibration and shock, no corrosive gas.

- Ambient Temperature
  Outdoor device (Fire Prevention Part): -40°C ~ 60°C
  Indoor device (Auto Control Panel): 5°C ~ 30°C

- Relative Humidity
  Outdoor device (Fire Prevention Part): ≤95 (@ 20°C±5°C)
  Indoor device (Auto Control Panel): ≤85 (@ 20°C±5°C)

- Power Source
  Working power source: AC230V OR DC24/110/220V
**General Arrangement of the System**

**Explosion Prevention of Transformers**

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<tr>
<th>Without NIOES</th>
<th>With NIOES</th>
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<td>![Image](Without NIOES.png)</td>
<td>![Image](With NIOES.png)</td>
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<td>The average pressure in the tank crosses the critical limit (approx over 8 bar) within few milli seconds of the fault initiation.</td>
<td>The fast activation of NIOES depressurises the tank back to its normal state, before the tank pressure reaches the critical stage.</td>
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**The Tank Explodes**

**The Tank Is Safe**
Characteristics of TRI-PARULEX NIOES

State-of-art concept: Rapidly drain oil to prevent explosion and inject nitrogen to prevent and extinct fire.

Excellent performance: Utilizing fast valves to drain oil within seconds with the most advanced technique.

Fast response: Once a fault signal is detected from the Transformer. The oil is drained within second after detection in order to release pressure and to avoid explosion. The nitrogen gas is injected after 1 to 20 second in order to mix and cool down the oil, to reduce the concentration of flammable gases, to isolate oxygen gas, and to extinct fire.

Reliability: Utilizing the principle of logic signal to prevent any improper or unnecessary activity to the system and to provide a more flexible system.

High efficiency: Able to inject nitrogen gas continuously for more than 30 minutes to completely cool down the transformer oil as well as prevent and extinguish fire.

Reduce pollution: No Environmental pollution due to the characteristic of nitrogen gas. Extinct fire without water is an advantage to the lack of water area.

Feasibility: Easy to install and maintain for both new or existing transformers with reasonable investment in a minor price compare to other traditional transformer fire extinction systems, such as water spraying systems and CO2 spraying systems.

Functions: Explosion Prevention and Fire Extinguishing system can extinguish the fire immediately with the Nitrogen Gas injected into the Transformer Tank.

The Nitrogen can be injected continuously for 30 Minutes to stir and cool down the transformer oil, which also isolated the air from the tank.

Scope of Application

Generator Power is unceasingly increasing with the development of technology, there are many transformer explosion happened due to ineffective of current breaker between the Generator and Power Transformer.

Tri-Parulex Nitrogen Injection System is suitable for new or remodeled Power transformer which are located in the high power plant, substations, indoor substations, underground substations, city substations and cold water deficient areas.
About Us

- Established in 1996 and serving for your safety from more than 23 years
- Our services include Consultation, Design & Engg., Supply, Installation, Testing & Commissioning, System Upgradation and after Sales service.
- We have expertise in national and international design practices such as NBC, TAC, NFPA, FM Global, OISD, BIS etc.
- We are equipped and conversant with the latest design softwares like AUTOCAD, SprinCAL, Pipenet etc.

Our Products

- Water Mist Fire Suppression System
- Nitrogen Injection & Oil Evacuation System (NIOES / NIFPS)
- Foam Based Fire Protection System
- Gas Based Fire Suppression System
- HVW / MVW Water Spray System
- Compressed Air Foam (CAF) Portable Units
- Quick Detection & Fire Suppression System
- Fire Detection & Alarm System
- First Aid Fire Extinguishers

Our Partners

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